4.5 Temporary Downdrain Structure

Dn1

Definition

A pipe used as a temporary structure to convey a concentration of stormwater down the face of cut or fill slopes.

Purpose

Temporary downdrain structures are used to safely conduct storm runoff from one elevation to another without causing slope erosion.

Conditions

Temporary downdrains are used on slopes where a concentration of stormwater could cause erosion damages. These structures are removed once the permanent water disposal system is installed.

Design Criteria

Placement

Downdrain structure shall be installed on undisturbed soil or well-compacted fill.

Diameter

Sufficient capacity is required to convey the maximum runoff expected during the life of the drain.

Downdrain Inlet and Outlet

Use a Tee or "L" inlet at the top of the slope. Slope the entrance ½ inch per foot toward the outlet. Thoroughly compact selected soil around the inlet section to prevent the pipe from being washed out by seepage or piping. Stabilize the outlet section, a Tee outlet, rock riprap, or other suitable material. See Figure 4.5.1.

Pipe

Design the slope drain using heavy-duty, flexible materials such as non-perforated, corrugated plastic pipe or specially designed flexible tubing. Use reinforced, hold-down grommets or stakes to anchor the pipe at intervals not to exceed 10 feet with the outlet end securely fastened in place. The pipe must extend beyond the toe of the slope.

TABLE 4.5.1

Pipe Diameter for Temporary Downdrain Structure

Maximum Drainage Area per Pipe (acre)	Pipe Diameter (inches)
0.3	10
0.5	12
1.0	18

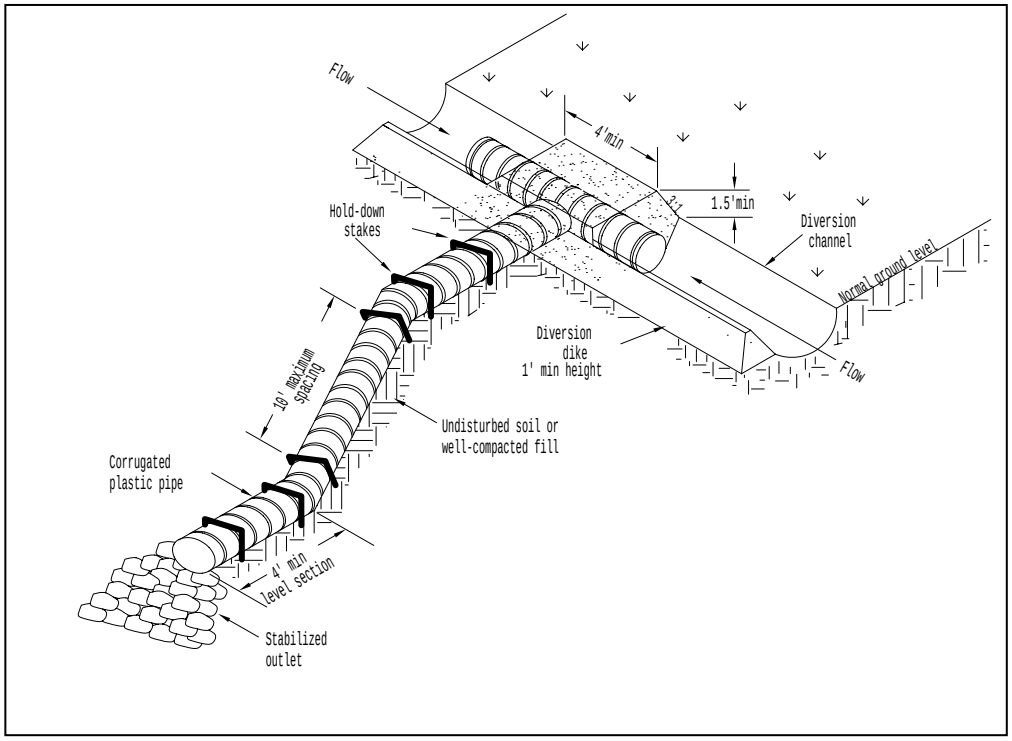

Figure 4.5.1 Temporary Downdrain and Inlet Detail

Construction Specifications

A common failure of slope drains is caused by water saturating the soil and seeping along the pipe. This creates voids from consolidation and causes washouts. Proper backfilling around and under the pipe "haunches" with stable soil material and hand compacting in 6-inch lifts to achieve firm contact between the pipe and the soil at all points will eliminate this type of failure.

1. Place slope drains on undisturbed soil or well-compacted fill at locations and elevations shown on the plans.

2. Slightly slope the section of pipe under the dike toward its outlet.

3. Hand tamp the soil under and around the entrance section in lifts not to exceed 6 inches.

4. Ensure than fill over the drain at the top of the slope has minimum dimensions of 1.5-foot depth, 4-foot top width, and 3:1 side slopes.

5. Ensure that all slope drain connections are watertight.

6. Ensure that all fill material is well compacted. Securely fasten the exposed section of the drain with grommets or stakes spaced no more than 10 feet apart.

7. Extend the drain beyond the toe of the slope and adequately protect the outlet from erosion.

8. Make the settled, compacted dike ridge no less than 1 foot above the top of the pipe at every point.

9. Immediately stabilize all disturbed areas following construction.

Maintenance

Inspect the slope drain and supporting diversion after every rainfall and promptly make necessary repairs. When the protected area has been permanently stabilized, temporary measures may be removed, materials disposed of properly, and all disturbed areas stabilized appropriately.